MWH

October 15, 2004

Kevin Adler
Remedial Project Manager
Region V, Mail Code SR-6J
U.S. Environmental Protection Agency
77 West Jackson Boulevard
Chicago, Illinois 60604-3590

Re: Final Work Plan for Lower Aquifer Groundwater Investigation - Phase 1
American Chemical Service (ACS) National Priorities List (NPL) Site
Griffith, Indiana

Dear Kevin:

A database of upper and lower aquifer groundwater quality at the ACS NPL Site in Griffith, Indiana, has been developed over many years of investigations and monitoring activities.

In the upper aquifer, two areas outside the barrier wall have been identified as having volatile organic compound (VOC) impacts, and these are being remediated by a combination of pump-and-treat, chemical oxidation, and monitored natural attenuation.

VOCs have also been detected in samples from four monitoring wells completed in the lower aquifer. These include monitoring wells MW09R, MW10C, MW53, and MW56. The primary compounds detected in samples from these wells are benzene and chloroethane; the same as detected in samples from upper aquifer plume area. These wells are located to the west and northwest of the ACS Site (Figure 1). Historical concentrations for these four wells are presented as concentration versus time plots in Figure 2.

A plot of these results on a map does not indicate the existence of a plume of contamination in the lower aquifer. Investigations have shown that leakage along the well annulus from the upper aquifer is the likely source of impact at two of the locations, MW09 and ATMW4D. These wells have been abandoned and replaced with MW09R and MW56, respectively. Since replacement, the concentrations of benzene and chloroethane in samples from MW09R have decreased significantly. This suggests that the abandonment of well MW09 cut off the contamination source and natural attenuation is reducing VOCs locally in the lower aquifer. In samples from MW56, concentrations of benzene have been lower since replacing ATMW4D. However, recent results suggest an increasing concentration trend. This may be related to the continuous low-rate pumping system currently operating at MW56.

175 West Jackson Boulevard
Suite 1900
Chicago Illinois
60604-2814

Tel: 312 831 3000
Fax: 312 831 3889

VOCs have also been regularly detected in samples from MW10C. A low-rate (1 to 2 gallons per minute) extraction pump has been placed in MW10C and operated for more than a year. The extracted water is routed to the treatment plant. Sampling results during this time have been variable, without showing a decreasing trend.

Monitoring well MW53 is located at the downgradient property boundary northwest of the Site. Concentrations of benzene in samples from MW53 have shown a slowly increasing trend that recently has been above the EPA maximum contaminant level (MCL) of 5 µg/l. MW53 appears to be located in a generally downgradient direction from the MW09/MW09R location where the benzene reached the top of the lower aquifer by leaking down the well annulus from the upper aquifer. However, MW53 is screened at the bottom of the lower aquifer. Since there is not a strong downward gradient at either location, it seems unlikely that the two detections are related.

Conceptual cross-sectional diagrams are presented in Figures 3 and 4 to show the locations of the well screens and the benzene concentrations detected in samples from these wells during March 2004. The traces of these cross-sections are shown in Figure 1. Groundwater flow direction can be deduced from the potentiometric lines on the Figure. However, given the groundwater flow direction, and the location and depth of each monitoring well screen, there is no clear way to correlate the benzene concentrations from any of the locations to any of the others.

MWH has developed an investigation plan to collect data to address the following questions.

1. What is the nature and thickness of the clay confining layer northwest of the ACS facility?

2. What is the source of the impacts detected at MW10C?

3. What is the source of the impacts detected at MW53?

4. Are any of the impacts related to the benzene historically detected at MW09?

5. What caused the recent spike in benzene concentrations at MW10C and what is the cause of the bubbling (ether) occurring at this well?

A Quality Assurance Project Plan (QAPP), a Site Safety Plan (SSP), a Long-Term Groundwater Monitoring Plan (LTGMP), and an associated Field Sampling Plan (FSP) have been approved by U.S. Environmental Protection Agency (U.S. EPA) and Indiana Department of Environmental Management (IDEM) for previous groundwater investigations at the ACS Site.

This Work Plan includes task-specific sampling protocols and health and safety procedures that will be used in conjunction with these previously approved documents. The investigation will follow a phased approach. The initial phase will be to determine if there

is some connection among various lower aquifer impacts. Additional phases may be necessary to determine the downgradient extent of a plume if one is identified.

Scope of Work

This initial phase of the investigation will utilize direct-push technology (DPT) drilling methods to collect clay thickness data and groundwater samples in an array across the middle of the impact zone (Figure 5). The objectives of this phase are to confirm the thickness of the clay layer and to identify any plume extending from the Site and MW09R towards MW10C and MW53.

Up to ten DPT sample locations are proposed in an array from the area of monitoring well MW23 to the vicinity of MW10C. The proposed locations of the DPT boreholes are shown in Figure 5. This array runs approximately perpendicular to the northward groundwater flow direction within the lower aquifer. The boring locations were selected in part to correlate with areas of firmer ground in the wetlands so that access will be facilitated. Any access paths to these drilling locations will be temporary and will be restored upon completion of activities.

Since there is a strong downward hydraulic gradient between the upper and lower aquifers, the first step will be to install surface casings at each DPT location to protect against cross-contamination between the upper and lower aquifer during DPT sampling.

After the casings have been set, groundwater samples will be collected from four depths within the lower aquifer at each location utilizing DPT methods. These four samples will be collected at approximate elevations of 595, 580, 565, and 550 feet above mean sea level (amsl). The sample locations in the lower aquifer are shown graphically in the cross-sections provided in Figures 6 and 7.

Initially, five DPT boreholes (numbered 1, 2, 3, 4, and 5 in Figure 5) will be completed on a 100-foot spacing. Groundwater samples will be collected and submitted for VOC analysis on a 48-hour turn-around time. If initial results indicate that additional resolution is needed, then boreholes 8, 9, and 10 will be completed at the midpoints between the original boreholes where necessary. If additional resolution is not needed, then new locations for boreholes 8, 9, and 10 may be selected further to the west of borehole 1 or further to the east of borehole 5.

Boreholes 6 and 7 will be completed just north (downgradient) and south (upgradient) of monitoring well MW10C. Groundwater samples will be collected from the same elevations as in the other boreholes.

In addition to VOCs, groundwater samples collected at eight of the forty sample locations will also be analyzed for the natural attenuation parameters listed in Table 1. For these eight samples, two will be collected from each of the four sampling elevations within the lower aquifer.

Sampling Procedure

The detailed procedures for each lower aquifer DPT sample location are as follows:

- Soil samples will be collected by either DPT or hollow-stem auger (HSA) methods to confirm the depth of the top of the clay-confining layer (anticipated to be 15 to 18 feet bgs in this area), and to confirm that the clay layer is at least two feet thick. If the clay layer is less than two feet thick, the hole will be properly abandoned with bentonite and a new location will be selected. Soils will be screened using a photo-ionization detector (PID) to detect the presence of VOCs.

- After the depth to the top of the clay has been determined, a four-inch diameter permanent steel casing will be set two feet into the clay confining layer using 6¼-inch augers. The casing will be grouted in place with neat cement (312 IAC 13-5-1). Neat cement consists of a mixture of approximately 95% Portland cement and 5% bentonite (by weight). The neat cement will be pumped via tremie pipe into the borehole from the bottom of the annulus upward and left to cure for a minimum of 24 hours.

- After the grout has cured, DPT drilling will be continued within the cased borehole. Initially, soil samples will be collected continuously until the bottom of the confining clay layer is identified. In boreholes where the clay layer is observed to be less than 4 feet thick, soil sampling will be continued for another eight to ten feet to insure the bottom of the clay layer has been identified.

- Four groundwater samples will be collected from within the DPT rods in the lower aquifer. The sample depths will be at the approximate elevations 595, 580, 565, and 550 feet amsl.

  Actual groundwater sampling depths may be altered based on field observations. Groundwater samples will be collected through a 2.5-foot long stainless steel screen (or similar) attached to the ends of the DPT rods. After pushing it to the planned sampling depth, the screen will exposed and a Geoprobe® bladder pump will be lowered within the DPT rods to the screened interval to collect the sample.

  Groundwater will be pumped until the water appearance is clear and temperature, pH, and conductivity values have stabilized to within 10 percent over three consecutive readings taken at three-minute intervals. Once the parameters have stabilized, the groundwater sample will be collected. Other groundwater parameters (Dissolved oxygen [DO], oxidation-reduction potential (ORP), etc.) will be recorded but not used for stability requirements.

- Groundwater samples will be submitted for laboratory analysis of VOCs, and several natural attenuation parameters at selected locations. The VOC samples will be analyzed on a 48-hour turn-around time. Table 1 summarizes the approximate number of samples and the laboratory parameters and analytical method for each.

- The Geoprobe® bladder pumps have been approved by the U.S. EPA for low-flow groundwater sampling, however complications may arise due to the depths targeted for sampling. Other groundwater sampling methods will be available if the bladder pump proves unworkable. Alternative sampling methods may include tubing with a check-valve or a thin diameter stainless steel bailer.

- Upon completion, the borehole will be permanently sealed using a bentonite grout. The casing will be left in place to maintain the separation between the upper and lower aquifers.

- All downhole materials will be decontaminated between each boring. Clean, unused tubing will be utilized for each discreet sample interval.

- All purged groundwater and decontamination wash will be collected and transported to the GWTP for treatment. Soil cuttings will either be collected in drums or placed in the hazardous roll-off container at the GWTP for off-site treatment and disposal.

Quality Assurance/Quality Control Procedures

Quality Assurance/Quality Control (QA/QC) procedures will be performed in general accordance with the U.S. EPA-approved QAPP. All groundwater samples will be analyzed by Compuchem Laboratories, of Cary, North Carolina. The VOC analyses will be analyzed on a quick turn-around basis (48 hours), and the natural attenuation parameters will be analyzed on a normal turn-around basis. Sample handling and chain-of-custody procedures will be conducted in accordance with the procedures outlined in the QAPP to ensure that sample integrity is maintained.

Quality Control (QC) samples will be submitted for all analyses. For VOC analyses, the QC sample frequency will follow the procedures outlined in the QAPP: one trip blank, one duplicate and one equipment blank sample per every ten groundwater samples, and one matrix spike/matrix spike duplicate (MS/MSD) sample per every 20 samples. For the natural attenuation analyses, one duplicate sample will be collected for each parameter. The QC samples are included in Table 1.

Data validation procedures for VOC analyses will follow the QAPP procedures and protocols. For the natural attenuation parameters, a screening level QC review will be conducted which will compare the results to the duplicate samples and to the laboratory's standard QA/QC procedures.

Safety Protocols

A Task-Specific Safety Plan (TSSP) is provided in Attachment A. All health and safety procedures will follow the Pre-design SSP dated January 1996. Task-specific procedures and any pertinent updates to the SSP are outlined in this task-specific safety plan. Job Hazard Analyses are included in the TSSP.

In general, all work will be completed in modified Level D personal protective equipment. Air monitoring will be performed using a PID and a lower-explosive limit/oxygen (LEL/O_2) meter. The PID will measure for the presence of VOCs, and the LEL/O_2 meter will measure for explosive gases.

The main health and safety concerns include heat stress and specific drilling/mobilization hazards of working in the wetlands (unstable ground, biological hazards, and slip, trip and fall, etc.). These hazards are specifically addressed in the attached TSSP.

Reporting

The results of this investigation will be compiled and presented in a report. The report will include soil boring logs, sample results presented in tables and figures, and an evaluation of the results and any recommendation for a second phase of investigation if necessary.

Piezometer Installation

As part of this field mobilization activity, two upper aquifer piezometers will be installed to replace a barrier wall piezometer pair that was destroyed in recent years. These piezometers, P93 and P94, measured water levels inside and outside of the barrier wall along the west side of the On-Site Area. These piezometers are required by the Revised Long-Term Groundwater Monitoring Plan and the Performance Standard Verification Plan for the GWTP, and are not related to the lower aquifer investigation.

The piezometers will be installed via DPT methods and will be constructed of 1-inch polyvinyl chloride (PVC) materials with a 5-foot screen interval set near the bottom of the upper aquifer (approximately 15-20 feet bgs). The proposed location of this piezometer pair is shown in Figure 5. Actual locations will be determined in the field by MWH personnel familiar with the barrier wall location. The piezometers will be completed either with flush-mount protection covers or with aboveground protective covers and bollards.

Schedule

The tentative schedule is to conduct the activities outlined in this work plan in late summer or early fall of 2004.

We look forward to your review of this proposed Work Plan. If you have any questions or comments, please do not hesitate to contact me.

Sincerely,

MWH Americas, Inc.

Peter J. Vagt, Ph.D. CPG
Vice President

Attachments: Table 1 – Laboratory Analytical Summary
Figure 1 – Lower Aquifer Monitoring Wells and Surface Features Map
Figure 2 – Concentration vs. Time Plots for Selected Lower Aquifer Wells
Figure 3 – Cross Section A-A'
Figure 4 – Cross Section B-B'
Figure 5 – Proposed DPT Locations
Figure 6 – Proposed DPT Sampling Locations in Cross Section A-A'
Figure 7 – Proposed DPT Sampling Locations in Cross Section B-B'
Attachment A – Task-Specific Safety Plan Addendum

cc: P. Kasarabada, IDEM
B. Magel, Karaganis, White, and Magel
L. Campbell, Black & Veatch

CAS/PJV/jmf
J:\2090601 ACS\0122 General GW Remediation\Lower Aquifer Investigation\Work Plan\LAinv_Phase 1 FINAL.doc

Table 1
Laboratory Analytical Summary
Lower Aquifer Groundwater Investigation
American Chemical Service NPL Site
Griffith, Indiana

Laboratory Parameter	VOCs	Total Organic Carbon	Nitrate	Nitrite	Sulfate	Total Iron and Manganese	Dissolved Iron and Manganese	Methane, Ethane, Ethene	Dissolved Oxygen	Oxidation-Reduction Potential
Analytical Method	SW8260B	EPA 415.1	EPA 300.0	EPA 300.0	EPA 300.0	SW6010B	SW6010B	RSK 175	Field	Field Meter
Groundwater (10 locations)	40	8	8	8	8	8	8	8	40	40
Duplicates	4	1	1	1	1	1	1	1		
Matrix Spike	2									
Matrix Spike Duplicate	2									
Equipment blank	4									
Trip Blanks	10									
TOTAL	62	9	9	9	9	9	9	9	40	40

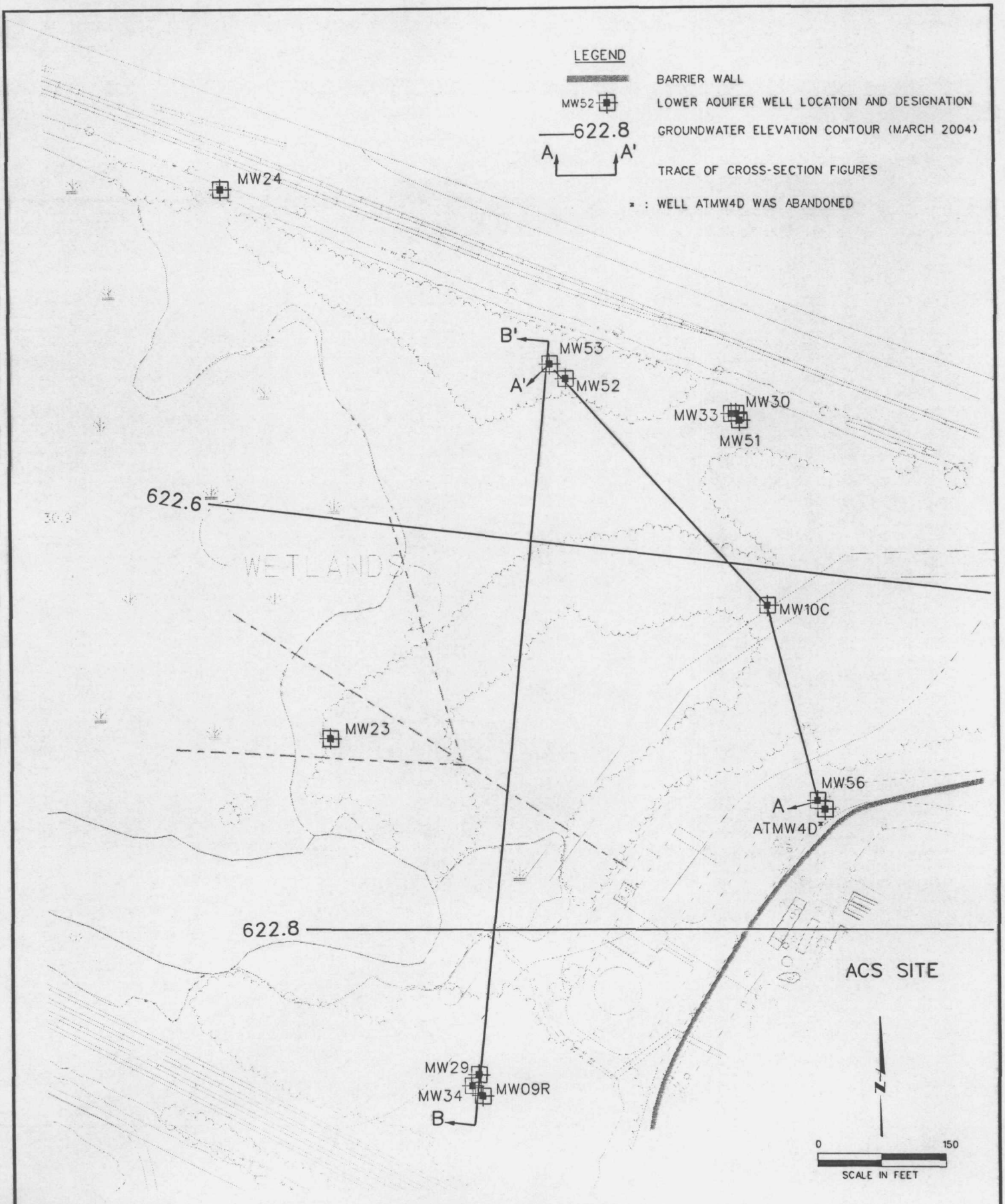
Notes

Analytical Methods with the prefix "SW" indicate SW-846 Methods.

Total iron and manganese analyses will be unfiltered, whereas dissolved iron and manganese samples will be filtered using disposable 0.45 micron filters.

Compuchem Laboratories, Cary, NC, will be conducting the analyses.

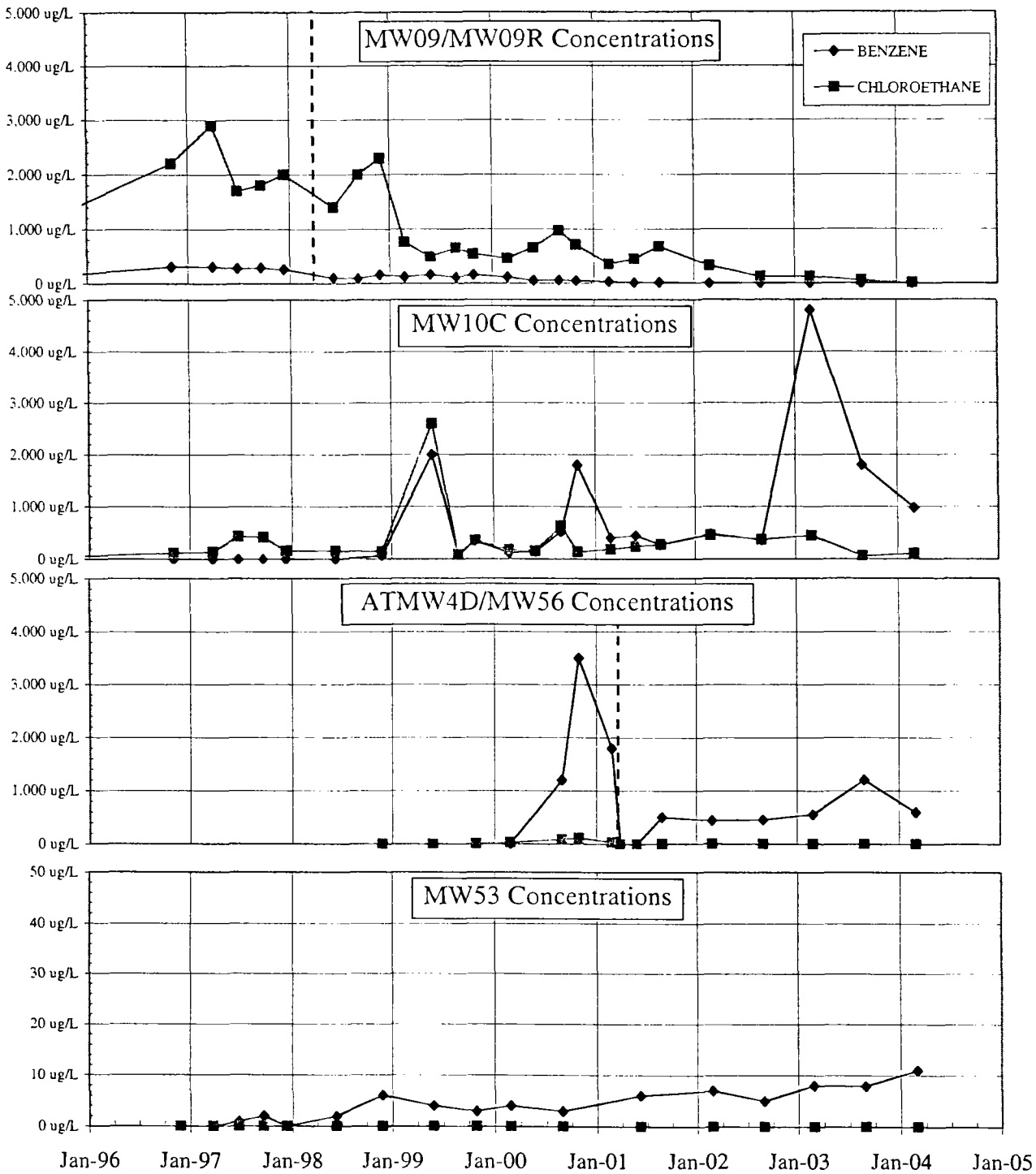
VOC's will be analysed on a 48-hour turn-around time



MWH	AMERICAN CHEMICAL SERVICE, INC. NPL SITE GRIFFITH, INDIANA	LOWER AQUIFER MONITORING WELLS AND SURROUNDING FEATURES MAP	FIGURE 1

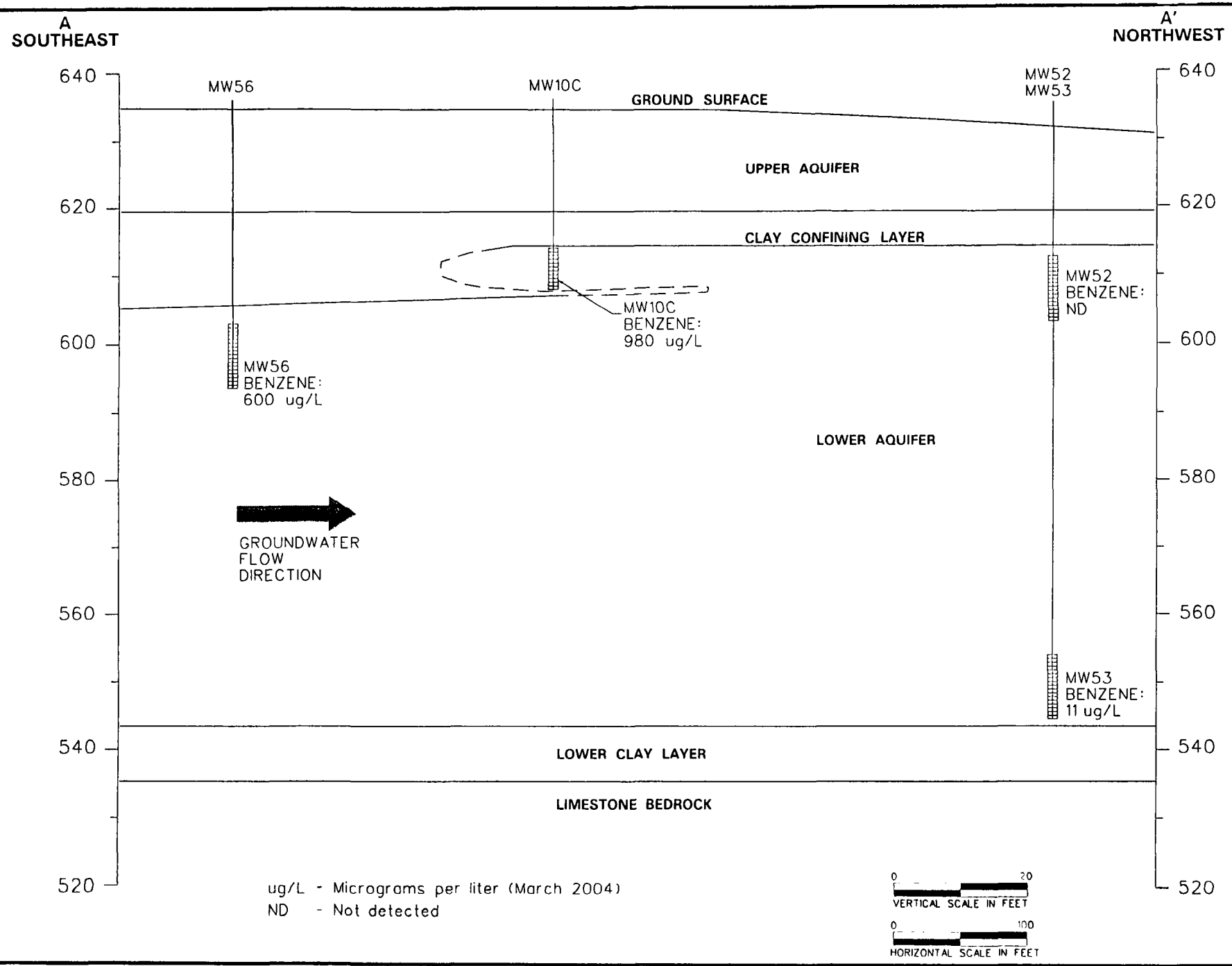
FILE: j:\209\0603 ACS\Drawings\LA_INV\DRAWINGS\Figure 1.dgn Plot Date: 12-OCT-2004 0:15

Figure 2. Concentration versus Time Plots for Selected Lower Aquifer Wells
American Chemical Service NPL Site, Griffith Indiana



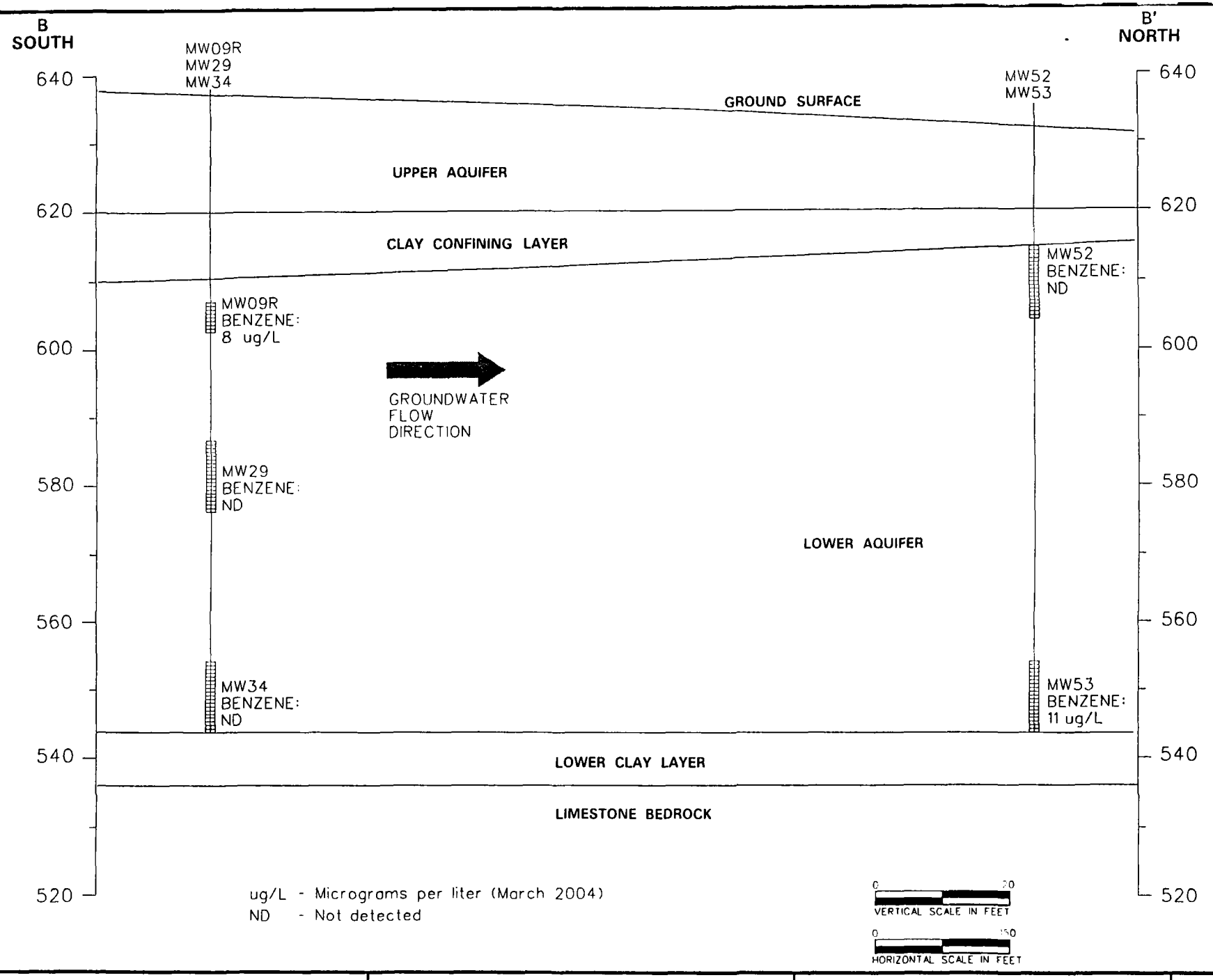
Notes:
Vertical dashed lines indicate when well was replaced (if applicable)
ug/l - micrograms per liter

CAS/PJV
J:/209/0603/Lower Aquifer/Phase1WP/LA_Figure2.xls[Figure 2]



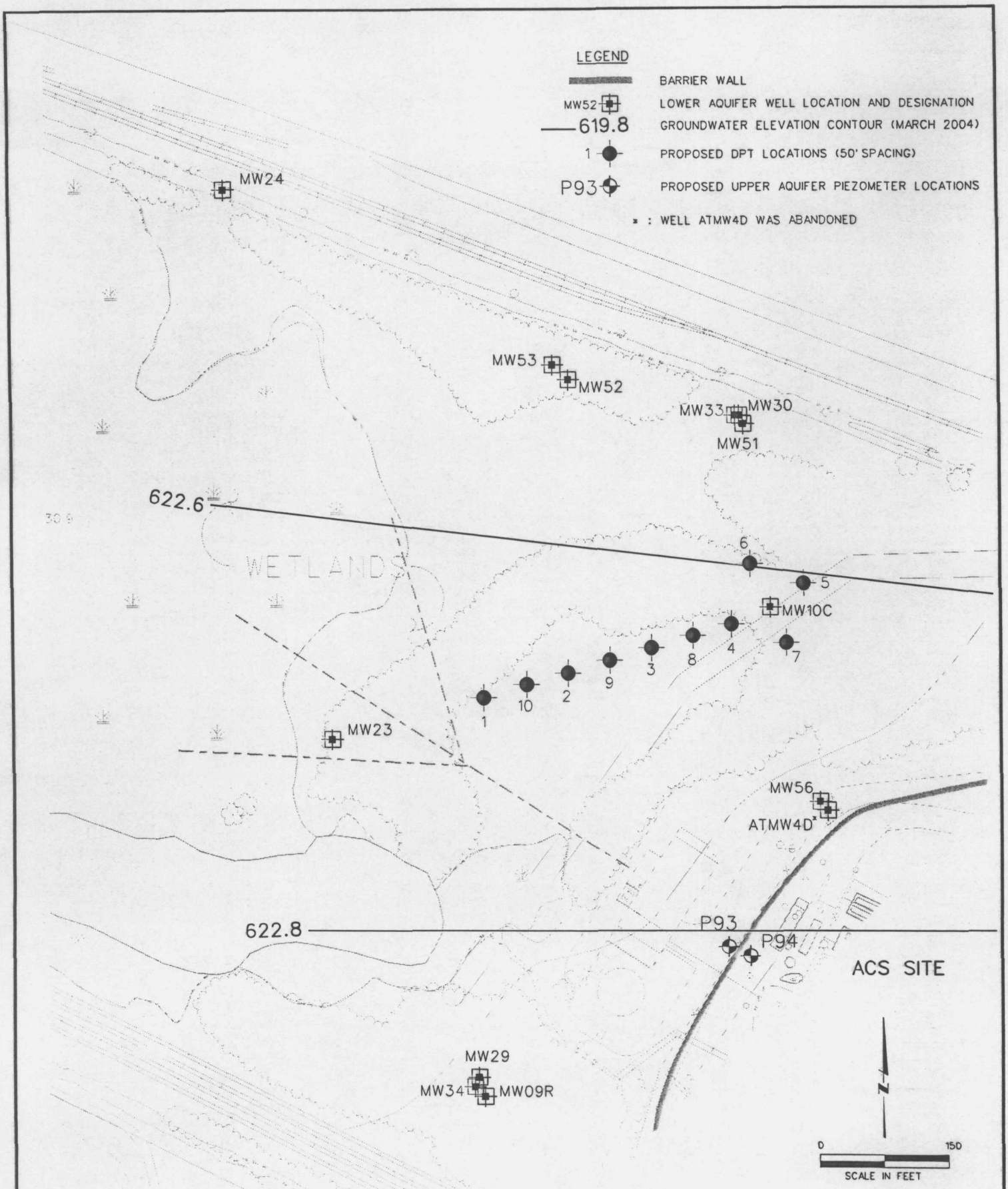
MWH	AMERICAN CHEMICAL SERVICE, INC. NPL SITE GRIFFITH, INDIANA	CONCEPTUAL CROSS SECTION A-A'	FIGURE 3

FILE: I:\209\0603 ACS\Drawings\LA_INV\DRAWINGS\Figure 3.dgn Plot Date: 11-MAY-2004 09:36



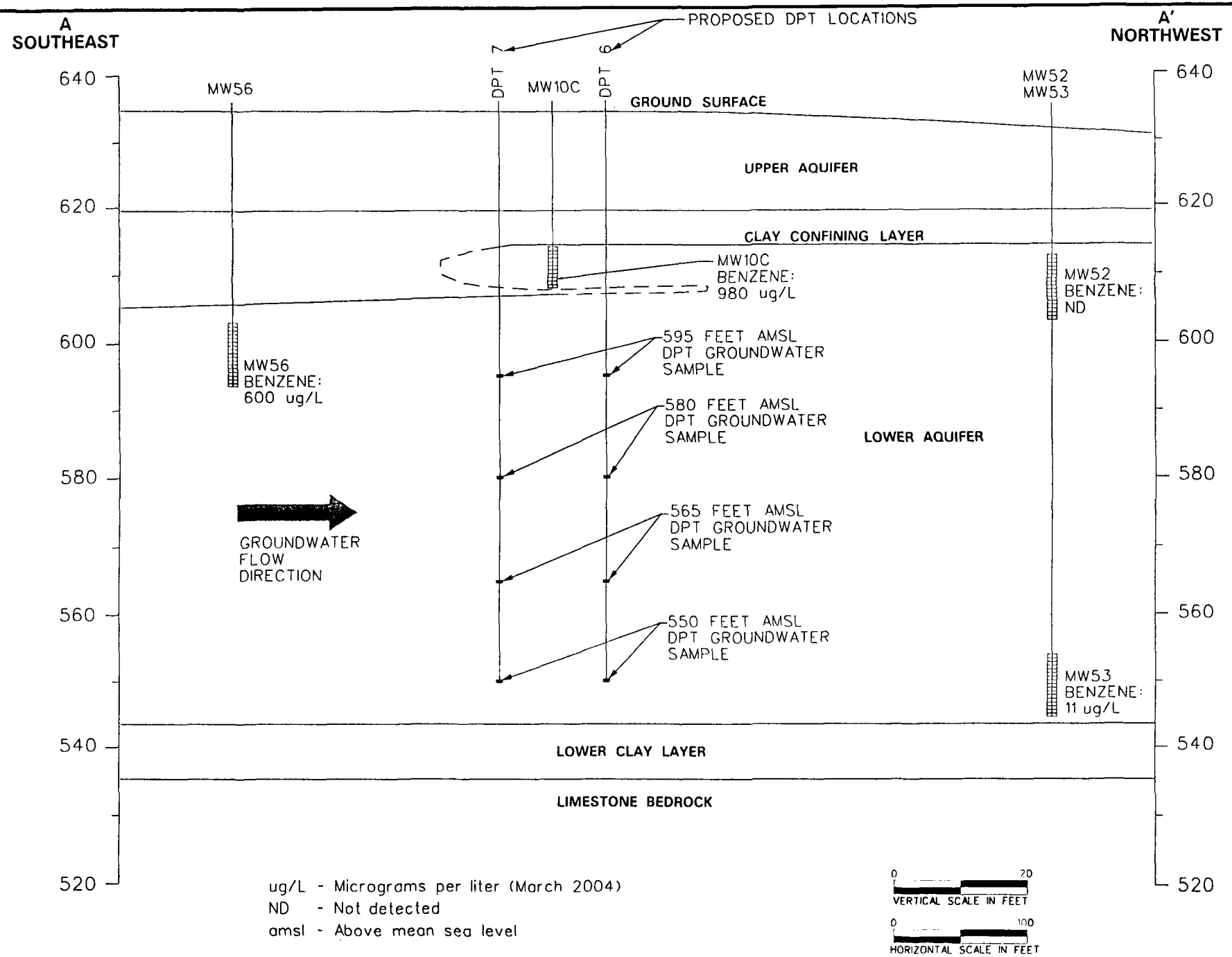
MWH	AMERICAN CHEMICAL SERVICE, INC. NPL SITE GRIFFITH, INDIANA	CONCEPTUAL CROSS SECTION B-B'	FIGURE 4

FILE: j:\209\0603 ACS\Drawings\LA_INV\DRAWINGS\Figure 4.dgn Plot Date: 11-MAY-2004 09:38



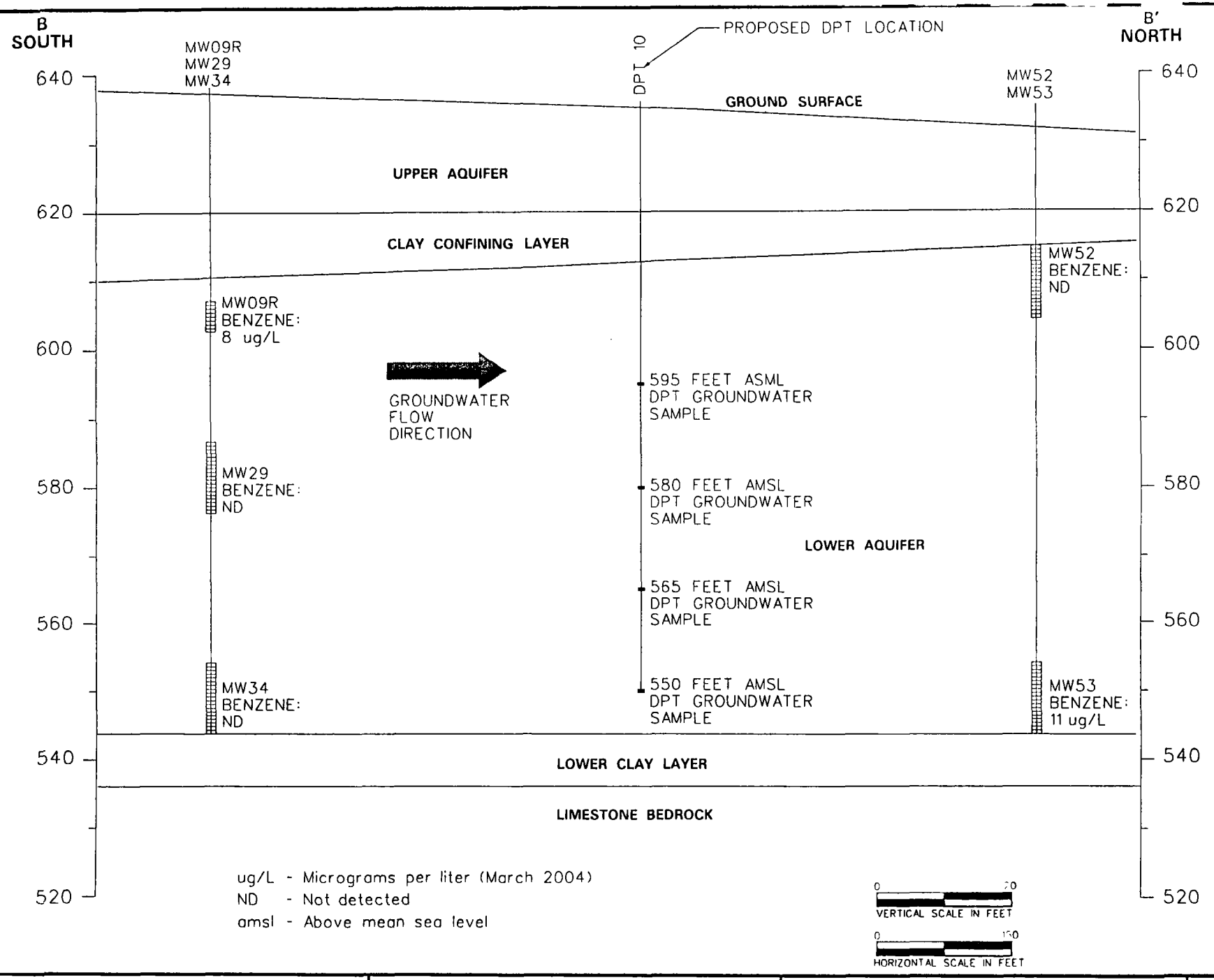
MWH	AMERICAN CHEMICAL SERVICE, INC. NPL SITE GRIFFITH, INDIANA	PROPOSED DPT LOCATIONS	FIGURE 5

FILE: I:\209\0603 ACS\Drawings\LA_INV\DRAWINGS\Figure 5.dgn Plot Date: 12-OCT-2004 0:20



MWH	AMERICAN CHEMICAL SERVICE, INC. NPL SITE GRIFFITH, INDIANA	PROPOSED DPT SAMPLING LOCATIONS IN CONCEPTUAL CROSS SECTION A-A'	FIGURE 6

FILE j:\209\0603 ACS\Drawings\LA_INV\DRAWINGS\Figure 6.dgn Plot Date: 18-MAY-2004 07:02



MWH	AMERICAN CHEMICAL SERVICE, INC. NPL SITE GRIFFITH, INDIANA	PROPOSED DPT SAMPLING LOCATIONS IN CONCEPTUAL CROSS SECTION B-B'	FIGURE 7

FILE: j:\209\0603 ACS\Drawings\LA_INV\DRAWINGS\Figure 7.dgn Plot Date: 18-MAY-2004 06:58

TASK-SPECIFIC SAFETY PLAN ADDENDUM
LOWER AQUIFER GROUNDWATER INVESTIGATION

AMERICAN CHEMICAL SERVICE, INC.
NPL SITE
GRIFFITH, INDIANA

MWH File No.: 2090603

Prepared For:

ACS RD/RA Executive Committee

Prepared By:

MWH Americas, Inc.
175 West Jackson Blvd.
Suite 1900
Chicago, Illinois 60604

October 2004

MWH
MONTGOMERY WATSON HARZA

TASK-SPECIFIC SAFETY PLAN ADDENDUM
LOWER AQUIFER GROUNDWATER INVESTIGATION

AMERICAN CHEMICAL SERVICE, INC.
NPL SITE
GRIFFITH, INDIANA

MWH File No.: 2090603

Prepared For:

ACS RD/RA Executive Committee

Prepared By: _____ 10/11/04
Chad A. Smith, P.G. Date
Professional Hydrogeologist

_____ 10/13/04
Scott Allen Date
Health and Safety Officer

Approved By: _____ 10/15/04
Peter J. Vagt, Ph.D., CPG Date
Vice President

EMERGENCY INFORMATION

Emergency Phone Numbers
(Nearest phone inside MWH Treatment Building or MWH Work Trailer)

Ambulance	911
Poison Control	(800) 222-1222
Police	911
Fire	911
State Highway Patrol	(800) 552-8917
IDEM Emergency Response	(888) 233-7745
EPA Region 5 Spill Response	(312) 353-2318

Nearest Phone, First Aid Kit, Fire Extinguisher, and Eye Wash Station — MWH Treatment Building

Nearest Hospital — Munster Community Hospital
901 McArthur Boulevard
Munster, Indiana
(219) 836-1600
(219) 836-4511 (emergency room)

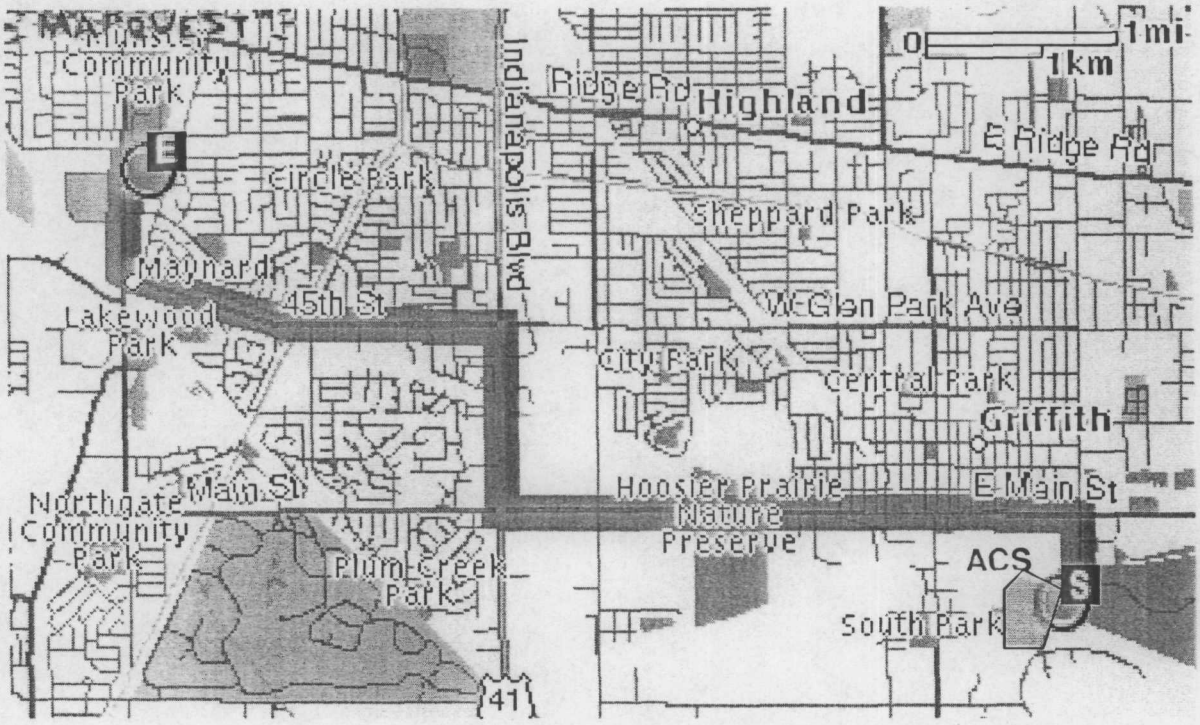
Project Contacts

MWH		
Project Coordinator (PC)	Joseph Adams, Jr.	(303) 410-4040
Project Manager	Peter Vagt	(312) 831-3466
Site Safety Officer (SSO)	Lee Orosz	(219) 924-4607
Health & Safety Officer (HSO)	Scott Allen	(312) 831-3820
Health & Safety Manager (HSM)	Mike Schmoldt	(248) 767-8211
Regulatory Agencies		
U.S. EPA Remedial Project Manager	Kevin Adler	(312) 886-7078
IDEM Project Manager	Prahbhakar Kasarabada	(317) 308-3121

Utilities

Utility Locate	IUPPS	(800) 382-5544
Telephone	Ameritech	(800) 636-1200
Gas/Electric	NIPSCO	(800) 634-3524
Water/Sewer	Griffith Public Works	(219) 924-3838

Directions to hospital: Exit ACS Site onto Colfax and go north to Main Street. Turn left onto Main Street and head west to Indianapolis Boulevard (Route 41). Turn right onto Route 41 and go north to 45th Street. Turn left onto 45th Street go west to Calumet Avenue. Turn right onto Calumet Avenue, and go north about 0.6 miles. Follow signs to the hospital emergency entrance, which is on the east side of street.



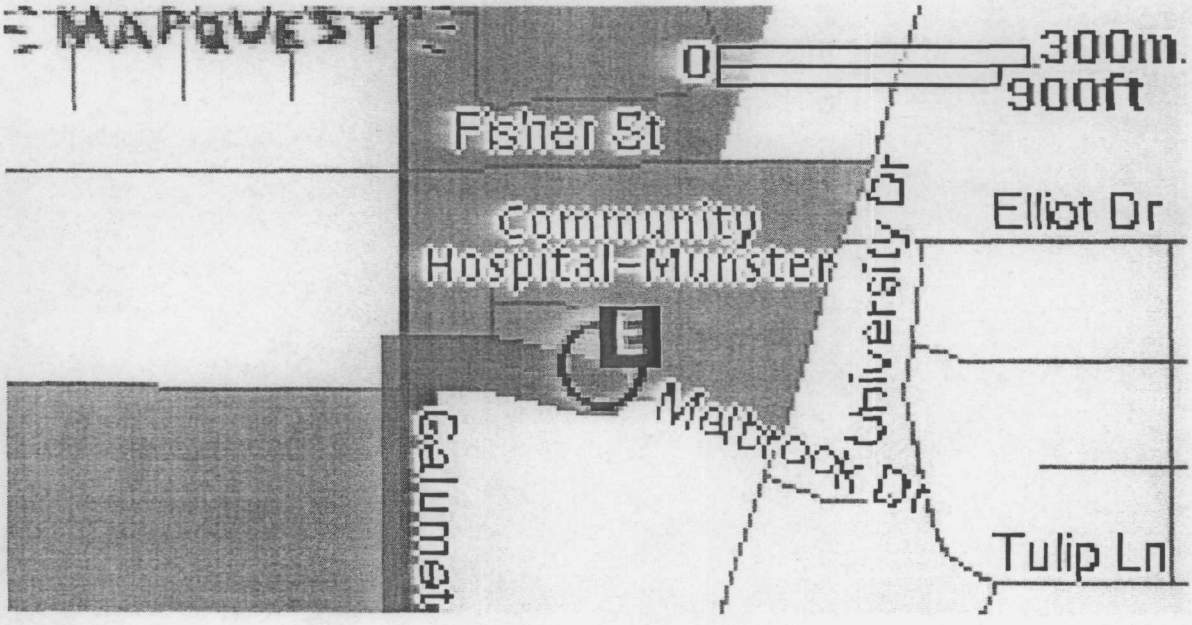


TABLE OF CONTENTS

APPENDICES

ACRONYMS AND ABBREVIATIONS

ACS	American Chemical Service, Inc.
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
CPR	Cardiopulmonary Resuscitation
dB	*decibels*
°F	Fahrenheit
FSP	Field Sampling Plan
HSO	Health and Safety Officer
HSM	Health and Safety Manager
IDEM	Indiana Department of Environmental Management
IDW	Investigative-Derived Waste
IUPPS	Indiana Underground Plant Protection Service, Inc.
JHA	Job Hazard Analyses
LEL	Lower Explosive Limit
LTGMP	Long-Term Groundwater Monitoring Plan
NIPSCO	Northern Indiana Public Service Company
NPL	*National Priorities List*
PC	Project Coordinator
PCB	polychlorinated biphenyl
PPE	personal protection equipment
ppm	parts per million
PID	photo-ionization detector
Predesign SSP	Predesign Site Investigation Site Safety Plan
OSHA	Occupational Health and Safety Administration
RD/RA	Remedial Design/Remedial Action
SVOC	Semi-Volatile Organic Compound
SSO	Site Safety Officer
SSP	Site Safety Plan
U.S. EPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

1.0 INTRODUCTION

This Task-Specific Site Safety Plan Addendum (SSP Addendum) addresses health and safety procedures during all activities associated with the lower aquifer groundwater investigation conducted at the American Chemical Service, Inc. (ACS) National Priorities List (NPL) Site. The procedures established in this SSP will minimize potential risk to MWH personnel performing on-site work. This SSP Addendum should be used in conjunction with the Predesign Site Investigation SSP (Predesign SSP) dated January 1996.

The Predesign SSP and this SSP Addendum apply to all MWH employees who will potentially be exposed to safety or health hazards associated with the field activities related to the Work Plan for Lower Aquifer Groundwater Investigation (Lower Aquifer Work Plan). Subcontractors will be required to provide their own SSP, which at a minimum, must comply with the requirements of the Occupational Safety and Health Administration (OSHA) Hazardous Waste Operation and Emergency Response Standards (29 CFR 1910.120) and other applicable OSHA regulations. The subcontractors' SSP must be reviewed by the MWH Health and Safety Officer (HSO).

This SSP Addendum has been developed based on knowledge of the specific chemical hazards and potential physical hazards associated with the planned activities, which include hollow-stem auger (HSA) and direct-push technology (DPT) drilling, soil core logging, and groundwater sampling. The activities outlined in the Work Plan are the initial phase of investigation in the lower aquifer, and it is anticipated that additional work will be conducted. Therefore, additional tasks that are anticipated for future completion are covered in this SSP addendum. These anticipated tasks include monitoring well and piezometer abandonment or installation, and water level measurement.

The Predesign SSP and this SSP Addendum have been prepared in compliance with the requirements of the OSHA Hazardous Waste Operation and Emergency Response Standards (29 CFR 1910.120) and other applicable OSHA regulations. Actual working conditions may require modification of this SSP Addendum. Except for minor modifications or in emergency situations, the MWH Health and Safety Manager (HSM) or local Health and Safety Officer (HSO) must approve any modifications before they can be implemented. Written documentation of the change must be attached as additional addenda to this SSP Addendum.

2.0 SITE DESCRIPTION AND SCOPE OF WORK

2.1 SITE DESCRIPTION

The ACS Site is located at 420 South Colfax Avenue in Griffith, Indiana. The facility began as a solvent recovery facility in 1955, with some chemical manufacturing operations beginning in the late 1960's. Detailed site descriptions are provided in Section 2.0 of the Predesign SSP, or various other reports.

While a wide range of contaminants has been detected inside the barrier wall, only a few volatile organic contaminants (VOCs), specifically benzene and chloroethane, have been identified as contaminants of concern in upper aquifer groundwater outside of the barrier wall. These same VOCs have been detected in a few monitoring wells screened in the lower aquifer. These wells are located northwest of the Site; however, it is unclear if the detections at these various wells are related. The Lower Aquifer Work Plan has been developed to collect additional data from the lower aquifer to determine if a contaminant plume exists and where it originated.

2.2 SCOPE OF WORK

The activities for phase 1 of this groundwater investigation in the lower aquifer include the following tasks:

- HSA and DPT drilling through the confining clay layer;
- Collecting groundwater samples from the boreholes; and
- Potential for installation of monitoring wells or piezometers.

All drilling activities will be conducted by the drilling subcontractor (yet to be chosen). MWH personnel will oversee and direct the drilling subcontractor, but will not handle drilling materials or operate the drill rigs.

3.0 PROJECT-SPECIFIC HEALTH AND SAFETY PROCEDURES

3.1 KEY PERSONNEL AND RESPONSIBILITIES

Assignment of responsibilities for development, coordination and implementation of this SSP Addendum is essential for proper administration of the Plan's requirements. Implementation of the SSP Addendum will be accomplished through an integrated effort of the Project Coordinator (PC), Health and Safety Officer (HSO), and Site Safety Officer (SSO).

Project Coordinator – The PC is primarily responsible for safety performance of the project and is the central point of contact with the ACS Remedial Design/Remedial Action (RD/RA) Executive Committee. Should a health and safety issue develop in the performance of the field activities, the PC will contact the ACS RD/RA Executive Committee and the MWH HSO.

Health and Safety Officer – The HSO is responsible for preparation of the SSP Addendum. The HSO will ensure that the SSP Addendum complies with OSHA standards and site-specific health and safety requirements based on known or anticipated health and safety concerns. The HSO will be available for consultation when required. The HSO may visit the Site during field activities to perform a site safety audit.

Site Safety Officer – The SSO is responsible for the implementation of the SSP Addendum. The SSO has the responsibility and authority to halt or to modify any work condition or remove personnel from the Site if he or she considers conditions to be unsafe. The SSO will be the main contact in any Site emergency situation. The SSO will ensure that all MWH personnel understand and comply with site safety requirements. If necessary, the SSO can modify the SSP Addendum to accommodate changes that may affect safety with the approval of the HSO. In the event of an accident, injury or 'near-miss' incident, a verbal report or form describing the incident must be filled out by the SSO and reported to the HSO. These reports should be submitted as soon as possible after the incident, as soon as it is safe to do so, or at least within 24 hours of the incident.

Field Staff – *All MWH field staff are responsible for understanding and complying with all* requirements of the Predesign SSP and this SSP Addendum. Each day before the start of field activities, a tailgate safety meeting will be conducted by the SSO or field team leader to instruct the field staff on the day's activities as well as this SSP Addendum's requirements. During this meeting, site safety questions can be directed to the meeting leader by the field staff. Each worker must sign and date a Tailgate Safety Meeting Form, or similar form used at Site, stating that he or she understands the contents of the Predesign SSP and this SSP Addendum. An example Tailgate Safety Meeting Form is attached in Appendix A.

3.2 SAFETY ISSUES OF CONCERN

The activities outlined in the Plan do not involve activities that pose severe hazards, however, as with any Site, caution must be taken to avoid the unexpected. The main activities include HSA and DPT drilling, and groundwater sampling. Anticipated future activities may include groundwater elevation monitoring, monitoring well or piezometer installation and abandonment. The safety issues related to these activities are outlined below.

3.2.1 Chemical

Although a wide variety of potential contaminants of concern have been identified at the ACS Site, these are primarily contained within the barrier wall. All Lower Aquifer Work Plan activities will take place outside of the barrier wall, where concentrations of contaminants are significantly lower. Based on groundwater data collected at the Site, volatile organic compounds (VOCs) are the compounds of concern in the groundwater outside of the barrier wall. Halogenated and light aromatic hydrocarbons are the main VOCs of concern. Semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), pesticides, and inorganics have not been detected in groundwater at significant amounts around the Site.

Compounds in the light aromatic hydrocarbon group are highly volatile, moderately soluble, biodegradable, and only slightly adsorbed on soils and sediments. Their presence at the surface is based on volatilization rates and biodegradation activities. They are very mobile in groundwater. Exposure to these substances is primarily through vapor inhalation, although absorption through skin may also readily occur. Acute exposure poses the primary health hazard of these substances. Low level exposure may result in irritability, excitability, muscle tremor, and headache. Benzene is the only light aromatic hydrocarbon compound of concern detected in samples from the lower aquifer monitoring wells; however, potential exists for other light aromatic hydrocarbons to be present. Compounds from this class of chemicals historically detected at the site include:

- Benzene
- Toluene
- Ethylbenzene
- Xylene

The halogenated hydrocarbons are highly mobile, and migrate easily through water, air, and soil. They may act on the central nervous system, either as a stimulant or depressant. Mild exposure may cause such symptoms as dizziness, nausea, abdominal pain, and vomiting. In chronic (long-term) exposure, loss of weight and appetite may occur. Moderately severe exposure presents those symptoms given above followed by severe irritability, convulsive seizures, and coma. Chloroethane is the only halogenated hydrocarbon of concern detected in samples from the lower aquifer monitoring wells; however, potential exists for other halogenated compounds to exist in groundwater or soil. Compounds from this class of chemicals historically detected at the site include:

- Chloroethane
- 1,2-dichloroethane

- 1,1,1-trichloroethane
- Trichloroethane

Benzene and chloroethane are the main VOCs detected in groundwater around the Site. Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX) compounds have also been detected south of the ACS Site, near MW06 and the entrance to the Griffith Landfill. Other halogenated VOCs have been detected at very low amounts in other areas around the Site.

3.2.2 Physical

General physical hazards at the ACS Site include common slip, trip, and fall hazards. Work Plan activities will be completed in the surrounding woods and wetlands where the slip, trip, and fall hazards are abundant, especially in wet or damp conditions. Caution should be taken while walking through the woods to avoid leaf-covered areas that may be covering holes or branches. Also, excessive noise generated by an active drill rig may inhibit awareness of personnel near the rig. Extra care should be used during active drill activities.

3.2.3 Biological

General biological hazards at the ACS Site include insects, snakes, rodents, poisonous plants, and spider species. The most common biological hazards include mosquitoes, ticks, and poison ivy. Special care should be taken to avoid these hazards, as they will likely be at their most potent during the drilling activities. Wear the appropriate clothing and repellant when necessary.

3.2.4 General

No eating, drinking, use of tobacco products, including smoking or chewing, or other hand-to-mouth activities will be permitted in the work areas during the course of this project. Eating, drinking, smoking and break areas are located just outside of the MWH Treatment Plant and Work Trailer.

3.3 AIR MONITORING

Air monitoring will be conducted during subsurface drilling activities to monitor for VOC vapors and oxygen content. It is not expected that VOC vapors or explosive atmospheres will be encountered. The presence of VOCs will be monitored by a photo-ionization detector (PID) with a lamp rating of 10.4 eV. The exposure action limits for worker breathing zones are:

- **<1 ppm as measured in PID instrument units.** No action, continue work.

- **1 ppm (continuous) as measured in PID instrument units.** Collect a colorimetric tube (Draeger tube) sample to determine whether breathing zone air contains 1 ppm or more of benzene.

- **<1 ppm as measured by colorimetric tube AND < 200 ppm as measured in PID instrument units.** Continue monitoring and proceed with work.

- **>1 ppm benzene as indicated by colorimetric tube.** If colorometric tube indicates the presence of benzene >1 ppm, stop work and withdraw from area for 15 minutes. Retest after 15 minutes. If reading is still >1 ppm as benzene cover exposed media and slow work rate. Retest again after 15 minutes. If still >1 ppm stop work and contact the Regional Health and Safety Manager for additional guidance.

- **>200 ppm as measured in PID instrument units.** Stop work and withdraw from contaminated area for 15 minutes. Retest after 15 minutes. If still >200 ppm as measured in instrument units, cover exposed media and slow work rate. Retest again after 15 minutes. If still >200 ppm, stop work and contact the Health and Safety Officer for additional guidance.

The oxygen content and explosive atmosphere will be measured by a Lower Explosive limit (LEL)/oxygen content (O_2) meter. The exposure action limits for the work zone are:

- **LEL exceeds 10% or the oxygen content decreases below 19.5%.** Stop work and withdraw from work area for 15 minutes. Retest after 15 minutes. Retest work area until conditions return to normal.

Air monitoring will be performed by MWH personnel at the start of drilling activities and approximately every 15 minutes, or if odors are encountered in the soil cuttings. The monitoring results will be recorded in the field book or a log form. The PID and LEL/O_2 meters will be calibrated at the beginning of each day, and will be performed per manufacturer's instruction.

3.4 PERSONAL PROTECTIVE EQUIPMENT

At a minimum, Level D PPE will be worn during Site activities. If air monitoring indicates that Level C is needed for Work Plan activities, then the PPE procedures in the Predesign SSP will be followed, or a separate addendum will be prepared and submitted for approval. A description of Level D PPE follows below:

Level D -- HSA/DPT drilling and groundwater sampling activities

- Steel-toe boots
- Latex or Nitrile gloves
- Hard hat
- Safety glasses
- Traffic Safety Vests* (around heavy equipment and high traffic areas)
- Hearing protection*(within 25 feet of drill rig)

- Latex boot covers*

- Tyvek*

* Optional PPE: use as needed

3.5 EMERGENCY INFORMATION

Prior to work startup, the SSO or field team leader will discuss the emergency medical assistance network at the Site with all personnel assigned to the field project. Locations of phones, fire extinguishers, first-aid kits, emergency telephone numbers, etc. will be identified. Unless otherwise noted, phones, fire extinguishers, and first-aid kits are all located at the MWH treatment building.

Emergency information is provided below and in the quick-reference sheet at the beginning of this document.

Emergency Phone Numbers
(Nearest phone inside MWH Treatment Building or Work Trailer)

Ambulance, Police, or Fire	911
Poison Control	(800) 222-1222
State Highway Patrol	(800) 552-8917
IDEM Emergency Response	(888) 233-7745
EPA Region 5 - Spill Response	(312) 353-2318
Nearest Phone, First Aid Kit, Fire Extinguisher, and Eye Wash Station	MWH Treatment Building
Nearest Hospital	Munster Community Hospital 901 MacArthur Boulevard, Munster, Indiana (219) 836-1600 (219) 836-4511 (emergency room)

Directions to hospital: Exit ACS Site onto Colfax and go north to Main Street. Turn left onto Main Street and head west to Indianapolis Boulevard (Route 41). Turn right onto Route 41 and go north to 45th Street. Turn left onto 45th Street go west to Calumet Avenue. Turn right onto Calumet Avenue, and go north about 0.6 miles. Follow signs to the hospital emergency entrance, which is on the east side of street.

Project Contacts

MWH

Project Coordinator	Joseph Adams, Jr.	(303) 410-4040
Project Manager	Peter Vagt	(312) 831-3466
Site Safety Officer (SSO)	Lee Orosz	(219) 924-4607
Health & Safety Officer (HSO)	Scott Allen	(312) 831-3820
Health & Safety Manager (HSM)	Mike Schmoldt	(248) 767-8211

Regulatory Agencies

U.S. EPA Remedial Project Manager	Kevin Adler	(312) 886-7078
IDEM Project Manager	Prahbhakar Kasarabada	(317) 308-3121

Utilities

Utility Locate	IUPPS	(800) 382-5544
Telephone	Ameritech	(800) 636-1200
Gas/Electric	NIPSCO	(800) 634-3524
Water/Sewer	Griffith Public Works	(219) 924-3838

3.6 JOB HAZARD ANALYSES

Appendix B contains Job Hazard Analyses (JHA) for the various tasks to be completed during this project. The JHAs summarize particular hazards that may be associated with the various activities outlined in this Work Plan.

3.7 DECONTAMINATION

3.7.1 Personal

All safety gloves will be disposed of in the appropriate container. If gloves or other clothing is grossly contaminated, it will be cleaned prior to disposal. All decontamination water will be collected and disposed of at the MWH Treatment Building. Prior to snack or lunch breaks, each person should thoroughly wash his or her hands and face in soap and water. At the end of each day, each person involved in Site activities should shower as soon as possible.

3.7.2 Equipment

In general, sampling and drilling equipment will be decontaminated between each borehole. Certain sampling equipment will be decontaminated between each sampling location within the same borehole. Decontamination procedures will be conducted in accordance with Section 4.5 of the Field Sampling Plan (FSP; Appendix B of the Revised Long-Term Groundwater Monitoring Plan, MWH, September 2002). In general, equipment will be cleaned in an alconox detergent wash and then rinsed with water. Certain drilling equipment will be decontaminated using a steam pressure wash. All decontamination water will be collected for treatment at the MWH Treatment Plant.

3.8 INVESTIGATIVE DERIVED WASTE

Anticipated Investigative Derived Wastes (IDWs) to be generated during activities include liquids, solids, and general refuse.

- Liquid IDW includes groundwater collected during purging during groundwater sampling, and decontamination wash and rinse water. All liquid IDW will be disposed at the MWH treatment plant, where it will be treated and discharged to the wetlands.

- Solid IDW includes soil cuttings generated during drilling activities. MWH will arrange for proper off-site disposal of these wastes.

- General refuse IDW includes disposable sampling equipment and PPE, such as disposable nitrile gloves. This material will be placed in trash bags and disposed of as solid waste at a local landfill, as long as it is not grossly contaminated. Grossly contaminated refuse will be cleaned prior to disposal or placed with solid IDW.

4.0 GENERAL SITE HEALTH AND SAFETY CONSIDERATIONS

This section describes general health and safety concerns not associated with specific tasks to be accomplished at the Site.

4.1 WEATHER CONDITION RESTRICTIONS

Since weather conditions on Site cannot be controlled, Site personnel are to be aware of the warnings of impending severe weather and the precautions that are to be taken. Thunderstorms, tornadoes, and winter storms can develop quickly, and jeopardize the safety of Site personnel. Should severe weather threaten, the Site Safety Officer (SSO) has the authority to place site activities on standby, to cease operations, and evacuate the Site as deemed necessary. The following procedures are to be followed in the event of severe weather.

4.1.1 Thunderstorms and Lightning

- Monitor weather conditions at all times. Check the weather forecast at the beginning of each day for the latest weather information.

- When a thunderstorm accompanied by lightning is in the project area, cease work immediately. All powered equipment, such as drill rigs, are to be shut down. Wait at least 15 minutes after the last lightning strike to continue work.

- Seek shelter inside nearby buildings or trailers. If there are no buildings nearby, stay inside a vehicle. If away from any form of shelter, do not stand beneath tall, isolated trees or telephone poles. Avoid hill tops, open water, metal equipment, wire fences and metal pipes.

- If you are caught in a level field or open area far from shelter, and you feel your hair stand on end, lightning may be about to strike you. Drop to your knees and bend forward, putting your hands on your knees. You should minimize the body area in direct contact with the ground, and avoid lying flay on the ground.

- If someone has been struck by lightning, monitor life signs and begin administering Cardiopulmonary resuscitation (CPR) as needed. Send for help. Check conscious victims for burns, especially at the fingers and toes and next to knuckles and jewelry. Administer first aid for shock. Do not let the victim walk around.

4.1.2 Tornadoes

- Tornadoes usually develop from thunderstorms and normally occur at the trailing edge of the storm. Most tornadoes occur in the months of April, May, June, and July in the late afternoon and early evening hours.

- When storms are predicted for the project area, monitor weather conditions on a radio. A tornado watch is issued when favorable conditions exist for the development of a tornado, a tornado warning is issued by the local weather service office whenever a tornado has actually been sighted.

- If a tornado warning is issued, seek shelter immediately. If there are permanent buildings, go there immediately, moving towards interior hallways or the lowest floor. If no shelter is nearby, lie flat in a ditch or depression and hold onto something on the ground, such as a bush or fence post.

- Once a tornado has passed the Site, Site personnel are to assemble at the MWH treatment building immediately to determine if anyone is missing. Administer first aid and seek medical attention as needed.

4.1.3 Winter Storms

- When snow or ice storms are predicted for the project area, Site personnel should monitor weather conditions on a radio. A winter storm watch is issued when a storm has formed and is approaching the area, and a winter storm warning is issued when a storm is imminent and immediate action is to be taken.

- When a storm watch is issued, monitor weather conditions and prepare to halt site activities. Notify the project manager of the situation. Seek shelter at site building or leave the site and seek warm shelter.

- If caught in severe winter weather while traveling, seek warm shelter if road conditions prevent safe travel.

- If stranded in a vehicle during a winter storm, stay in the vehicle, wait for help, and keep a window open an inch or so to avoid carbon monoxide. Run the engine sparingly to keep warm, and try to exercise occasionally.

4.2 TEMPERATURE STRESS

Since hot or cold weather cannot be controlled, site personnel need to be aware of engineering controls that can reduce temperature stress, the signs and symptoms of temperature stress and first aid measures for victims of temperature stress. The procedures for monitoring temperature stress follows below:

4.2.1 Cold Stress

- In general, if extreme cold temperatures exist (<0 °F), the continuance of work should be evaluated. Groundwater sampling may not be feasible at temperatures far below freezing.

- Reduction of cold temperatures can be achieved by spot heating: shielding work areas from wind, and using heated rest areas (including vehicles).

- Cold stress can be reduced by drinking warm drinks or soups frequently, using heated rest areas frequently, using the buddy system, and taking extra breaks as needed. Do not pressure someone to work beyond his or her capabilities.

- Reorganize work procedures so as much of a job can be done in a warm environment as possible.

- Remove wet clothing if possible.

- Send a worker to warm shelter immediately if any of the following symptoms are noted: heavy shivering, frostnip (skin turns white), feeling of excessive fatigue, drowsiness, euphoria.

- First aid: Take victim to a warm area and remove the outer layers of clothing. Gently warm the affected area, submerge in tepid water if possible. Do not rub. If there is evidence of frostbite, obtain medical attention immediately.

4.2.2 Heat Stress

- In general, if extreme hot temperatures exist (>100 °F), the continuance of work should be evaluated.

- Reduction of hot temperatures can be achieved by developing and adhering to a work-rest schedule and taking breaks in cool areas.

- Heat stress can be reduced by drinking cool fluids hourly, avoiding caffeine and alcohol, using the buddy system, and taking extra breaks as necessary. Do not pressure someone to work beyond his or her capabilities.

- Schedule work for the cooler parts of the day.

- If your heart rate exceeds 110 beats/minute at the beginning of a rest period, shorten the next work cycle by about 1/3. Also, you should not lose more than 1.5% of your total body weight in a day. If you do, drink fluids to compensate and prevent dehydration.

- Send worker to a cool shelter immediately if any of the following are noticed: heat rash, heat cramps (muscle spasms, pain in hands, feet or abdomen), heat exhaustion (pale, cool, moist skin; heavy sweating; dizziness; nausea; fainting), heat stroke (red, hot, usually dry skin; lack of perspiration; nausea; dizziness; confusion; strong, rapid pulse; coma).

- First aid: remove protective clothing and equipment and wrap the victim in wet towels or clothing. If there are signs of heat exhaustion or heat stroke, seek medical attention immediately.

4.3 HEAVY EQUIPMENT

Special safety procedures are required when working around operating heavy equipment. For the Work Plan, there is potential for working around heavy equipment, such as drill rigs. Hazards associated with operating heavy equipment include obstructed view, moving parts, overhead clearance, and noise. In general,

- Heavy equipment should be operated only by trained authorized personnel.

- Equipment should be inspected daily.

- Equipment should be equipped with backing alarms.

- Personnel working on the equipment or in the area should wear safety glasses, steel-toe safety boots, and hard hats.

- All safety switches must be operational.

- Drill rigs should remain at least 10 feet from overhead power lines and should not be moved with the boom raised.

- Non-essential personnel should remain a safe distance from these operations.

4.4 TRAFFIC

There are no road traffic issues associated with this project, as all work will be conducted away from any roads. High-visibility safety vests should be worn by all personnel when working near or operating any moving vehicle.

4.5 BIOLOGICAL HAZARDS

There is potential for site personnel to come in contact with certain biological hazards:

Biological - Occupationally induced infection can occur in any occupation as a result of exposure to bacteria, viruses, fungi, or parasites. A simple laceration from a sharp edge can become secondarily infected with staphylococci or streptococci. A thorn, a wood splinter, or a metal slug acting as a foreign body can pave the way for secondary infection of the skin. Cuts, scrapes, or other lacerations should be cleaned, disinfected, and dressed immediately following standard first aid procedures.

Plants – A broad variety of plants and wood cause injury to skin through primary irritation or allergic sensitization. Examples include poison ivy and sumac. Site personnel are required to wear long plants while at the Site. Contact with poisonous plants should be avoided. If skin contact is made with poisonous plants, the exposed area will be washed with soap and water followed by rubbing alcohol. Seek medical advice if severe reaction occurs.

Insects – Insect bites and stings can be serious to hypersensitive persons and even deadly depending on the type of insect. Examples include bees, wasps, hornets, brown recluse spiders, mosquitoes, and ticks. Specific diseases of concern are Lyme disease and West Nile Virus. Avoid tall grassy areas or other areas of thick vegetation. If work is performed in these areas, personnel should wear light colored clothing (for easy tick spotting) and a commercially available repellant, and check for ticks regularly.

Animals – Animal bites are a concern because of the potential for the animal to carry the rabies virus, which attacks the nervous system. If an animal bite occurs the victim must be taken to the nearest medical facility immediately.

4.6 UTILITIES

All utilities must be cleared before performing any intrusive activities, such as monitoring well installation. The SSO will verify that utilities have been cleared before work begins at the site. See Section 3.5 for further information on utility clearance.

4.7 NOISE

Hearing protection is required when working in close proximity to heavy equipment, such as drill rigs, if the level of noise interferes with communication or the sound level exceeds 85 decibels (dB). Hearing protection is required within 25 feet of the following operations:

- Driving the split spoon sampler
- During core drilling

Hearing protection must always be worn when using this equipment:

- Power tools
- Air compressor

CAS/SA/jmf
J:\2090\0503 ACS\Lower Aquifer\Phase 1 WP\HASP\LA_SSP_2.doc
2090603.030401

APPENDIX A

TAILGATE SAFETY MEETING FORM

TAILGATE SAFETY MEETING FORM

Date: _____ Time: _____

Scope of Work: _____

_____

Safety Topics Covered

Chemical Hazards:	VOCs (benzene, chloroethane)	_____
Physical Hazards:	Equipment	_____
	Utilities	_____
	Temperature stress	_____
	Traffic	_____
	Trip, slip, fall	_____
	Weather conditions	_____
PPE:	Review of Level D	_____
Special Equipment:		_____
Decontamination:		_____
Other:	No smoking, eating or drinking in work areas	_____
Emergency Procedures:	Review location of first aid kit, etc.	_____
	Hospital route	_____

Name Printed	Signature
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Meeting Conducted by: _____

APPENDIX B

JOB HAZARD ANALYSES

Job Hazard Analysis

WORK LOCATION:	American Chemical Service NPL Site, Griffith, Indiana.
ACTIVITY:	Lower Aquifer Groundwater Investigation.
TASK:	Soil Boring Drilling (Direct Push/ Hollow Stem Auger).

PRINCIPAL STEPS	POTENTIAL HAZARDS	RECOMMENDED CONTROLS	REQUIRED PERSONAL PROTECTIVE EQUIPMENT
General. A combination of direct-push technology (DPT) and hollow-stem auger (HSA) drilling will be conducted to collect groundwater samples from the lower aquifer. The drilling will be completed in a wooded wetlands area northwest of the ACS facility. 1. Drill soil boring to confining clay layer via DPT and HSA methods, and seal permanent steel casing into clay layer. Let casing set for 18-24 hours 2. Continue drilling via DPT methods to target depths for groundwater sampling 3. Abandon borehole and decontaminate equipment.	Chemical Hazards: Minor (potential for VOCs in soil and water, alconox used during decontamination). Radiological: None. Biological Hazards: Some (ticks, mosquitoes, poison ivy). Physical Hazards: Some (slip-trip- fall, pinch points on rig, loud noise, weather, temperature stress).	Chemical: Level D PPE and air monitoring (PID and LEL/O2 measurements while drilling). Avoid dermal contact with soils, water, or decontamination materials. Biological: Check for ticks. Wear appropriate clothing and insect spray. Avoid contact with poison ivy. Physical: Use caution while near drill rig; only trained personnel can operate drill rig; dress appropriately for weather; watch for cold/heat stress; always wear PPE (hard hat/ear plugs).	Level D PPE Hard hat Steel-toe boots Safety glasses Latex or nitrile gloves Hearing protection Traffic vests around heavy machinery and high traffic areas

List of Equipment to be used:	Training:	Inspections:
Drill rig (DPT and HSA combination rig) only operated by subcontractor. PID LEL/O_2 meter PID and LEL calibration gas	All MWH personnel and subcontractors will be 40-hr HAZWOPER trained with up-to-date 8-hr refresher training, and have medical clearance to work. Copies of all paperwork are to be kept on-site. CPR and first aid training required.	MWH requires contractors using equipment to perform a daily safety inspection. Equipment must be in good and safe operating condition, with any deficiencies identified and corrected, prior to use. Contractors may use their own inspection forms, or may ask for documentation assistance from MWH. Documentation must be available for audit.

References:

1. US OSHA 29 CFR 1910.132 Subpart I -*Personal Protective Equipment* (d) Hazard assessment and equipment selection.
2. Job Hazard Analysis, U.S. Dept of Labor/ OSHA 3071 1998 (revised).
3. US Army Corps of Engineers EM 385-1-1. 01.A.09 *Activity Hazard Analysis.*
4. MWH's Health and Safety Manual & Procedures

MJS

Job Hazard Analysis

WORK LOCATION:	American Chemical Service NPL Site, Griffith, Indiana.
ACTIVITY:	Lower Aquifer Groundwater Investigation.
TASK:	Groundwater Sampling by DPT.

PRINCIPAL STEPS	POTENTIAL HAZARDS	RECOMMENDED CONTROLS	REQUIRED PERSONAL PROTECTIVE EQUIPMENT
General. Groundwater samples will be collected through direct-push technology (DPT) rods at various depths from the lower aquifer. Various sampling methods may be used for sample collection based on field conditions. The sampling will be completed in a wooded wetlands area northwest of the ACS facility. 1. Set up equipment and sample bottles. 2. Open and gauge well 3. Purge well until stabilized. 4. Collect sample. 5. Disassemble equipment.	Chemical Hazards: Minor (potential for VOCs in soil and water, alconox used during decontamination) Radiological: None Biological Hazards: Some (ticks, mosquitoes, poison ivy). Physical Hazards: Some (slip-trip- fall, pinch points on rig, loud noise, weather, temperature stress)	Chemical: Level D PPE and air monitoring (PID and LEL/O2 measurements while drilling.) Avoid dermal contact with soils, water, or decontamination materials. Biological: Check for ticks. Wear appropriate clothing and insect spray. Avoid contact with poison ivy. Physical: Use caution while near drill rig; only trained personnel can operate drill rig; dress appropriately for weather; watch for cold/heat stress; always wear PPE (hard hat/ear plugs).	Level D PPE Hard hat Steel-toe boots Safety glasses Latex or nitrile gloves Hearing protection Traffic vests around heavy machinery and high traffic areas

List of Equipment to be used:	Training:	Inspections:
Groundwater sampling equipment (some bladder pumps may utilize compressed inert gas) PID LEL/O_2 meter PID/LEL calibration gas	All MWH personnel and subcontractors will be 40-hr HAZWOPER trained with up-to-date 8-hr refresher training, and have medical clearance to work. Copies of all paperwork are to be kept on-site. CPR and first aid training required.	MWH requires contractors using equipment to perform a daily safety inspection. Equipment must be in good and safe operating condition, with any deficiencies identified and corrected, prior to use. Contractors may use their own inspection forms, or may ask for documentation assistance from MWH. Documentation must be available for audit.

References:

1. US OSHA 29 CFR 1910.132 Subpart I -*Personal Protective Equipment* (d) Hazard assessment and equipment selection.
2. Job Hazard Analysis, U.S. Dept of Labor/ OSHA 3071 1998 (revised).
3. US Army Corps of Engineers EM 385-1-1, 01.A.09 *Activity Hazard Analysis.*
4. MWH's Health and Safety Manual & Procedures

MJS

Job Hazard Analysis

WORK LOCATION:	American Chemical Service NPL Site, Griffith, Indiana.
ACTIVITY:	Lower Aquifer Groundwater Investigation.
TASK:	Groundwater Elevation Measurement.

PRINCIPAL STEPS	POTENTIAL HAZARDS	RECOMMENDED CONTROLS	REQUIRED PERSONAL PROTECTIVE EQUIPMENT
General. Measuring groundwater elevations at monitoring wells or piezometers surrounding the ACS facility. 1. Open well casing and remove well plug. 2. Insert water level meter and collect reading. 3. Withdraw meter and close well.	Chemical Hazards: Minor (potential for VOCs in water) Radiological: None Biological Hazards: Some (ticks, mosquitoes, poison ivy). Physical Hazards: Minor (slip-trip- fall, weather, temperature stress).	Chemical: Level D PPE Biological: Check for ticks. Wear appropriate clothing and insect spray. Avoid contact with poison ivy. Physical: dress appropriately for weather; watch for cold/heat stress; wear PPE.	Modified Level D PPE: Steel-toe boots Safety glasses Latex or nitrile gloves Hard hat and safety vests if working around machinery or drill rig.

List of Equipment to be used:	Training:	Inspections:
Water Level Meter Extra gloves	All MWH personnel will be 40-hr HAZWOPER trained with up-to-date 8-hr refresher training, and have medical clearance to work. CPR and first aid training required. Copies of all paperwork are to be kept on-site.	

References:

1. US OSHA 29 CFR 1910.132 Subpart I -*Personal Protective Equipment* (d) Hazard assessment and equipment selection.
2. Job Hazard Analysis, U.S. Dept of Labor/ OSHA 3071 1998 (revised).
3. US Army Corps of Engineers EM 385-1-1, 01.A.09 *Activity Hazard Analysis.*
4. MWH's Health and Safety Manual & Procedures

MJS

Job Hazard Analysis

WORK LOCATION:	American Chemical Service NPL Site, Griffith, Indiana.
ACTIVITY:	Lower Aquifer Groundwater Investigation.
TASK:	Monitoring Well Installation.

PRINCIPAL STEPS	POTENTIAL HAZARDS	RECOMMENDED CONTROLS	REQUIRED PERSONAL PROTECTIVE EQUIPMENT
General. Hollow-stem auger (HSA) drilling may be conducted to install monitoring wells for groundwater monitoring. The drilling may be completed in a wooded wetlands area northwest of the ACS facility. 1. Drill boring to desired depth. Soil samples may be collected via split spoon for analyses. 2. At desired depth well materials are installed. The well is then completed with sand pack and bentonite. 3. Remove remaining auger flights and complete surface completion of well.	Chemical Hazards: Minor (potential for VOCs in soil and water, alconox used during decontamination) Radiological: None Biological Hazards: Some (ticks, mosquitoes, poison ivy) Physical Hazards: Some (slip-trip- fall, pinch points on rig, loud noise, weather, temperature stress).	Chemical: Level D PPE and air monitoring (PID and LEL/O2 measurements while drilling.) Avoid dermal contact with soils, water, or decontamination materials. Biological: Check for ticks. Wear appropriate clothing and insect spray. Avoid contact with poison ivy. Physical: Use caution while near drill rig; only trained personnel can operate drill rig; dress appropriately for weather; watch for cold/heat stress; always wear PPE (hard hat/ear plugs)	Level D PPE Hard hat Steel-toe boots Safety glasses Latex or nitrile gloves Hearing protection Traffic vests around heavy machinery and high traffic areas

List of Equipment to be used:	Training:	Inspections:
Drill rig - only operated by subcontractor PID LEL/O_2 meter PID/LEL calibration gas	All MWH personnel and subcontractors will be 40-hr HAZWOPER trained with up-to-date 8-hr refresher training, and have medical clearance to work. Copies of all paperwork are to be kept on-site. CPR and first aid training required.	MWH requires contractors using equipment to perform a daily safety inspection. Equipment must be in good and safe operating condition, with any deficiencies identified and corrected, prior to use. Contractors may use their own inspection forms, or may ask for documentation assistance from MWH. Documentation must be available for audit.

References:

1. US OSHA 29 CFR 910.132 Subpart I -*Personal Protective Equipment* (d) Hazard assessment and equipment selection.
2. Job Hazard Analysis. U.S. Dept of Labor/ OSHA 3071 1998 (revised).
3. US Army Corps of Engineers EM 385-1-1. 01.A.09 *Activity Hazard Analysis.*
4. MWH's Health and Safety Manual & Procedures

MJS